

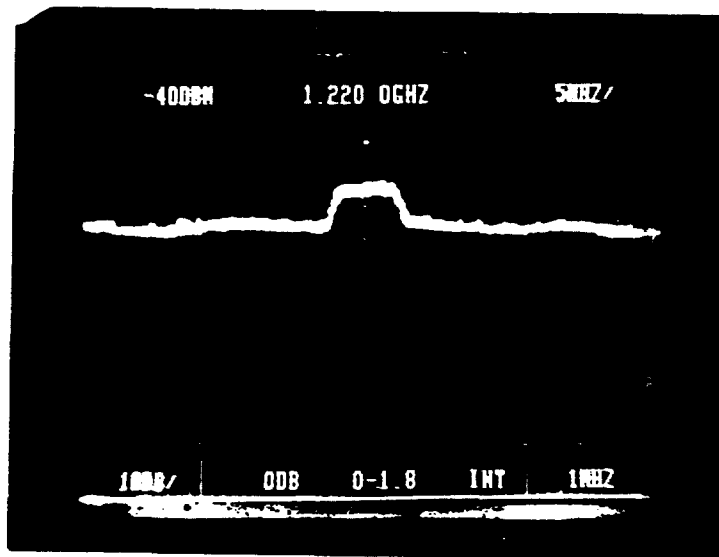
King Ranch, Texas

Reference  
Level  
dBm<sub>i</sub>

Diversified Communications Engineering

Azimuth: 60°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

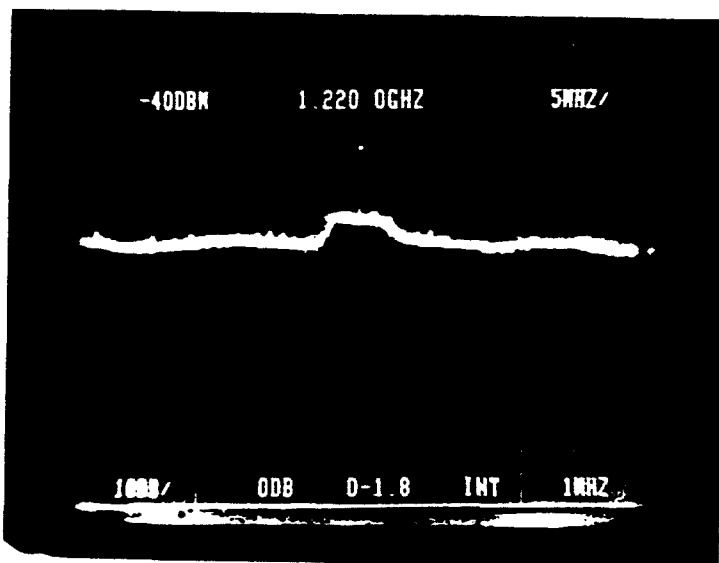
Level: -145 dBm<sub>i</sub>

(A)

Reference  
Level  
dBm<sub>i</sub>

Azimuth: 75°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -149 dBm<sub>i</sub>

(B)

Figure 3.2-4 RF Spectrum Analysis

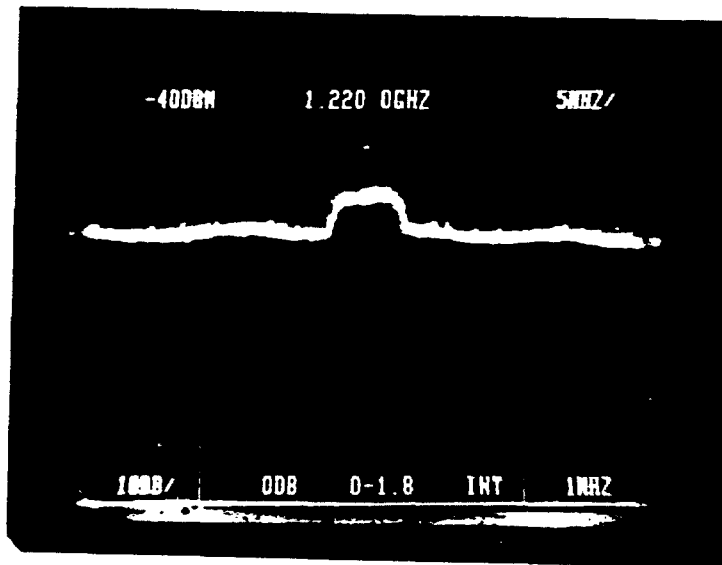
King Ranch, Texas

Azimuth: 90°

Diversified Communications Engineering

Reference  
Level  
dBm<sub>i</sub>

-123



Antenna Centerline: 9 Ft.

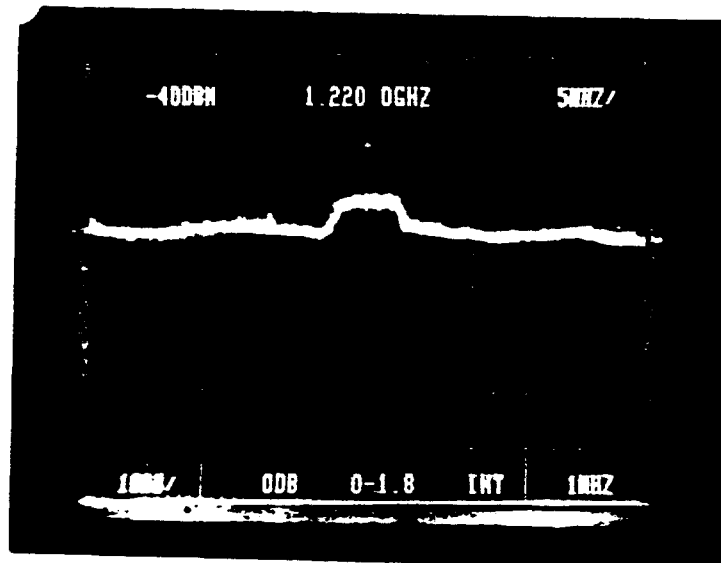
Elevation: 32 degrees

Level: -145 dBmi

(A)

Reference  
Level  
dBm<sub>i</sub>

-123



Azimuth: 105°

Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -147 dBmi

(B)

Figure 3.2-5 RF Spectrum Analysis

King Ranch, Texas

Reference  
Level  
dBm<sub>i</sub>

Diversified Communications Engineering

Azimuth: 120°

-123



Antenna Centerline: 9 Ft

Elevation: 32 degrees

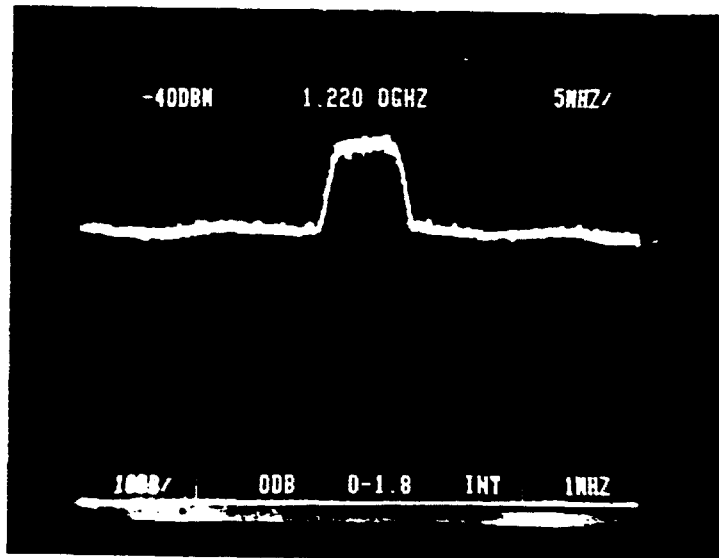
Level: -147 dBm<sub>i</sub>

(A)

Reference  
Level  
dBm<sub>i</sub>

Azimuth: 135°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -135 dBm<sub>i</sub>

(B)

Figure 3.2-6 RF Spectrum Analysis

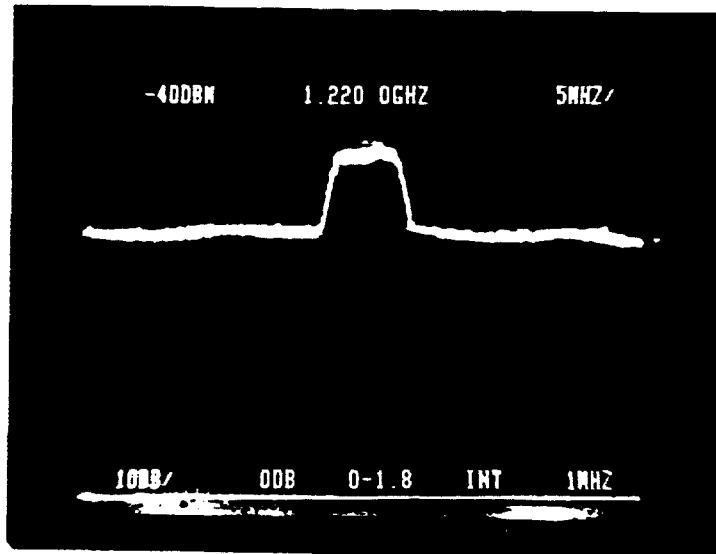
King Ranch, Texas

Diversified Communications Engineering

Azimuth: 150°

Reference  
Level  
dBm<sub>i</sub>

-123



Antenna Centerline: 9 Ft.

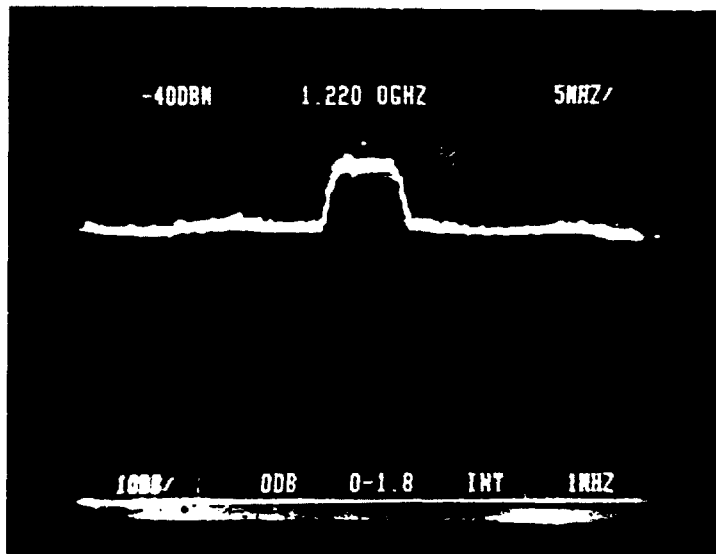
Elevation: 32 degrees

Level: -138 dBmi

(A)

Reference  
Level  
dBm<sub>i</sub>

-123



Azimuth: 165°

Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -140 dBmi

(B)

Figure 3.2-7 RF Spectrum Analysis

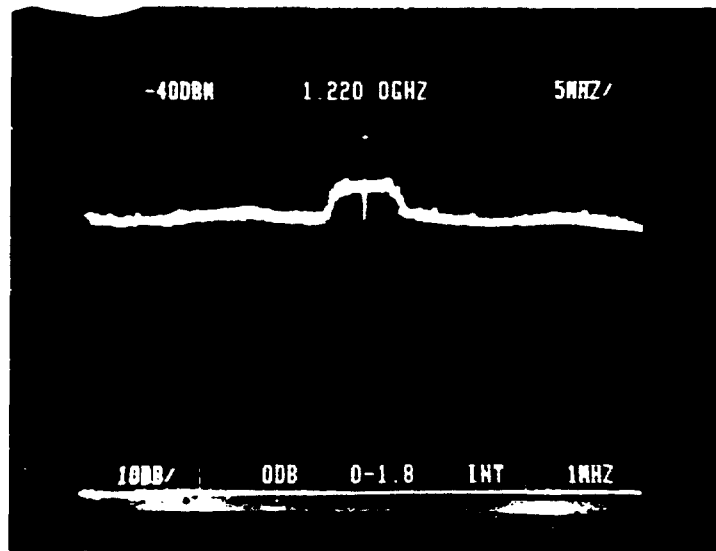
King Ranch, Texas

Azimuth: 180°

Reference  
Level  
dBm<sub>i</sub>

Diversified Communications Engineering

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

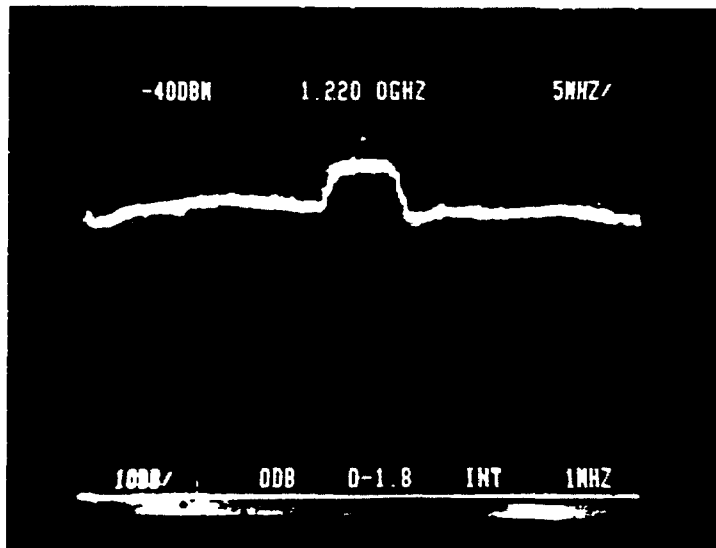
Level: -145 dBmi

(A)

Reference  
Level  
dBm<sub>i</sub>

Azimuth: 195°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -141 dBmi

(B)

Figure 3.2-8 RF Spectrum Analysis

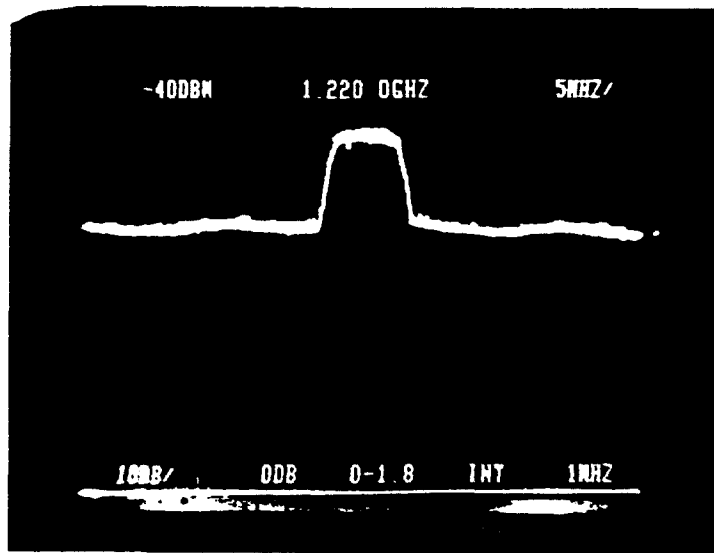
King Ranch, Texas

Diversified Communications Engineering

Azimuth: 210°

Reference  
Level  
dBm<sub>i</sub>

-123



Antenna Centerline: 9 Ft.

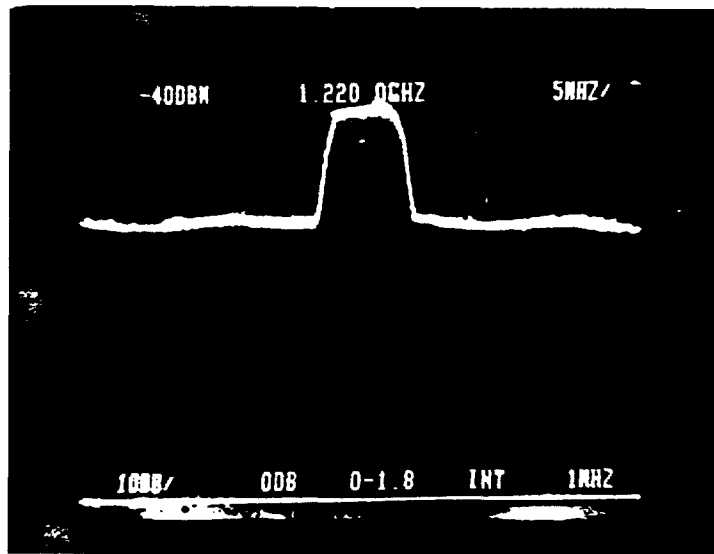
Elevation: 32 degrees

Level: -136 dBm<sub>i</sub>

(A)

Reference  
Level  
dBm<sub>i</sub>

-123



Azimuth: 225°

Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -131 dBm<sub>i</sub>

(B)

Figure 3.2-9 RF Spectrum Analysis

King Ranch, Texas

Diversified Communications Engineering

Azimuth: 240°

Reference  
Level  
dBm<sub>i</sub>

-123



Antenna Centerline: 9 Ft

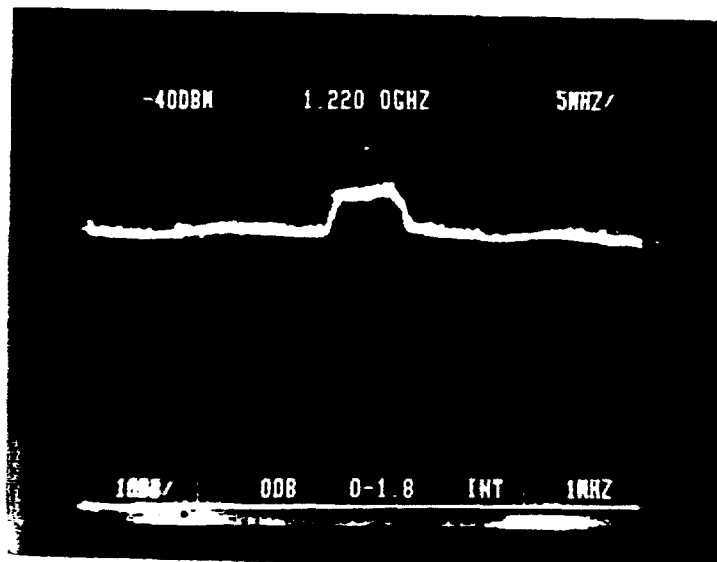
Elevation: 32 degrees

Level: -141 dBm<sub>i</sub>

(A)

Reference  
Level  
dBm<sub>i</sub>

-123



Azimuth: 255°

Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -144 dBm<sub>i</sub>

(B)

Figure 3.2-10 RF Spectrum Analysis

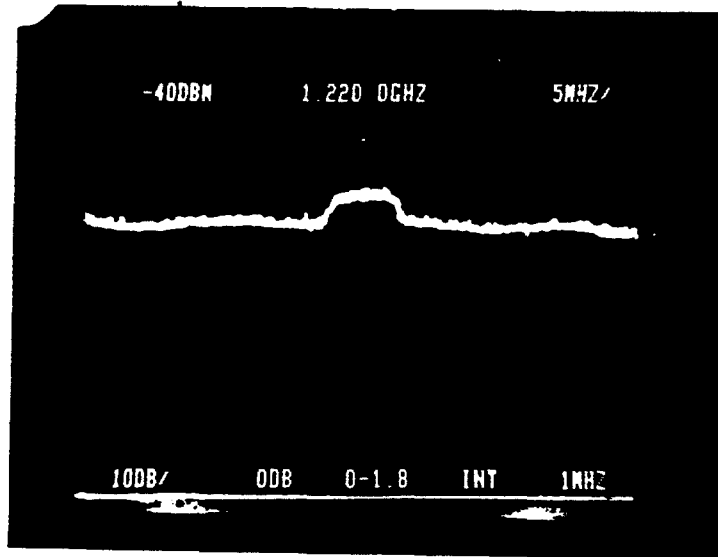
King Ranch, Texas

Azimuth: 270°

Reference  
Level  
dBm<sub>i</sub>

Diversified Communications Engineering

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

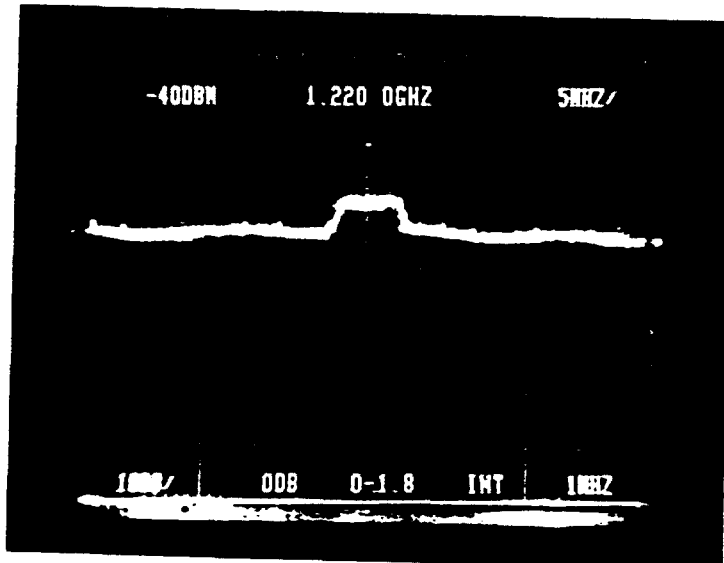
Level: -146 dBmi

(A)

Reference  
Level  
dBm<sub>i</sub>

Azimuth: 285°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -146 dBmi

(B)

Figure 3.2-11 RF Spectrum Analysis

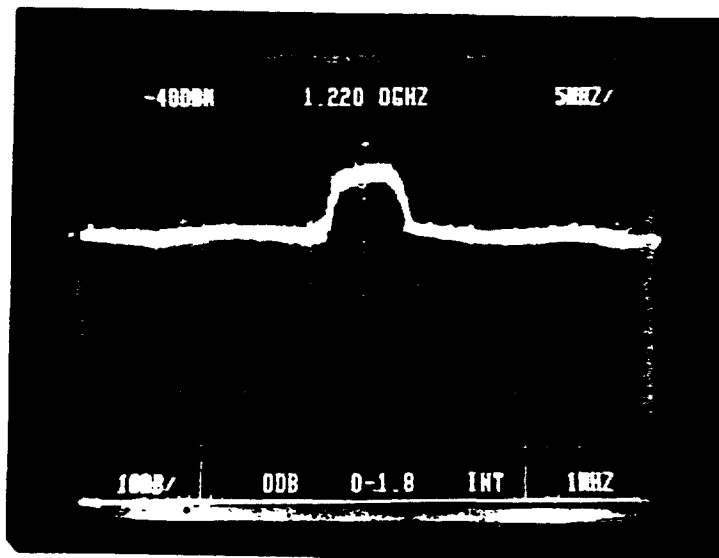
King Ranch, Texas

Diversified Communications Engineering

Azimuth: 300°

Reference  
Level  
dBm<sub>i</sub>

-123



Antenna Centerline: 9 Ft.

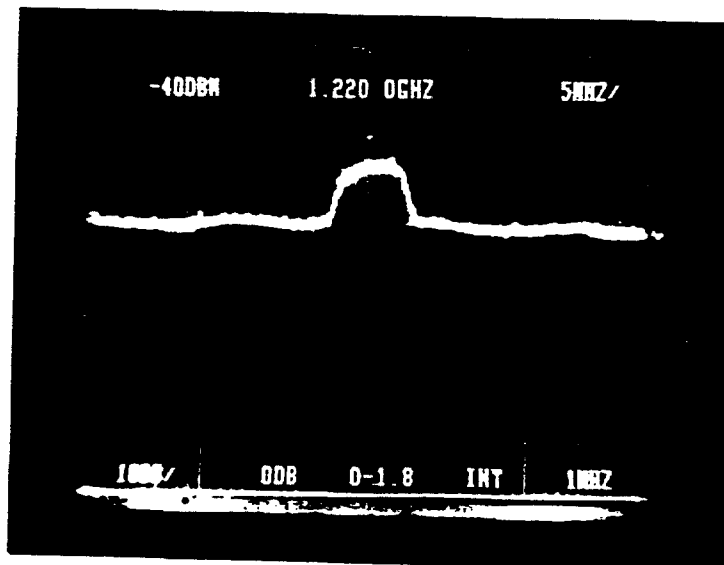
Elevation: 32 degrees

Level: -141 dBmi

(A)

Reference  
Level  
dBm<sub>i</sub>

-123



Azimuth: 315°

Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -141 dBmi

(B)

Figure 3.2-12 RF Spectrum Analysis

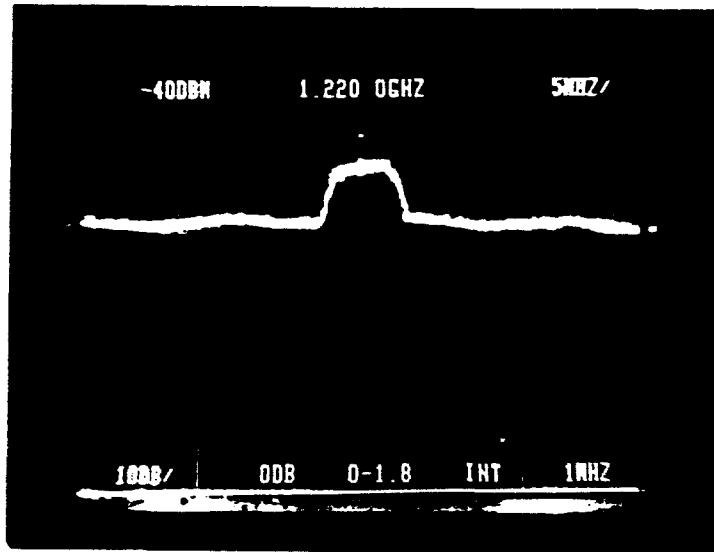
King Ranch, Texas

Reference  
Level  
dBm<sub>i</sub>

Diversified Communications Engineering

Azimuth: 330°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

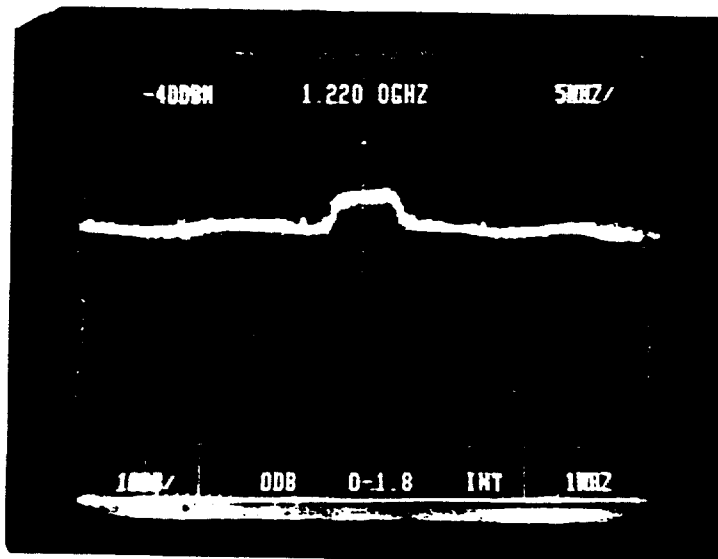
Level: -141 dBm<sub>i</sub>

(A)

Reference  
Level  
dBm<sub>i</sub>

Azimuth: 345°

-123



Antenna Centerline: 9 Ft.

Elevation: 32 degrees

Level: -146 dBm<sub>i</sub>

(B)

Figure 3.2-13 RF Spectrum Analysis

### **3.3 DBS Antenna Test #2 (Elevation)**

TRANSMITTER AT 52' AGL (GROUND ELEV: 85' AMSL)

XMTR OUTPUT POWER: 29 dBm    WAVEGUIDE LOSSES: 2 dB

XMIT ANT GAIN: 10 dBi

DBS ANTENNA AT 9' AGL (GROUND ELEV: 80' AMSL)

DISTANCE BETWEEN ANTENNAS = 1320"

DBS ANTENNA AT 180 DEGREES AZIMUTH (AWAY FROM TRANSMITTER)

RECEIVE LEVEL AT DBS ANTENNA SITE = -68 dBm (corrected for bandwidth)

AZIMUTH FROM TRANSMITTER TO DBS RECEIVER = 180 DEGREES

DBS antenna rotated through 45 degrees of elevation in 5 degree increments.

<u>DBS Antenna Elevation Angle</u>	<u>Receive Level at DBS Antenna (dBm)</u>
30	-123
35	-124
40	-125
45	-121
50	-120
55	-110
60	-108
65	-124
70	-116
75	-120

Figure 3.3-1 presents a plot of signal level and elevation. The measurement data is presented in Figures 3.3-2 through 3.3-6.

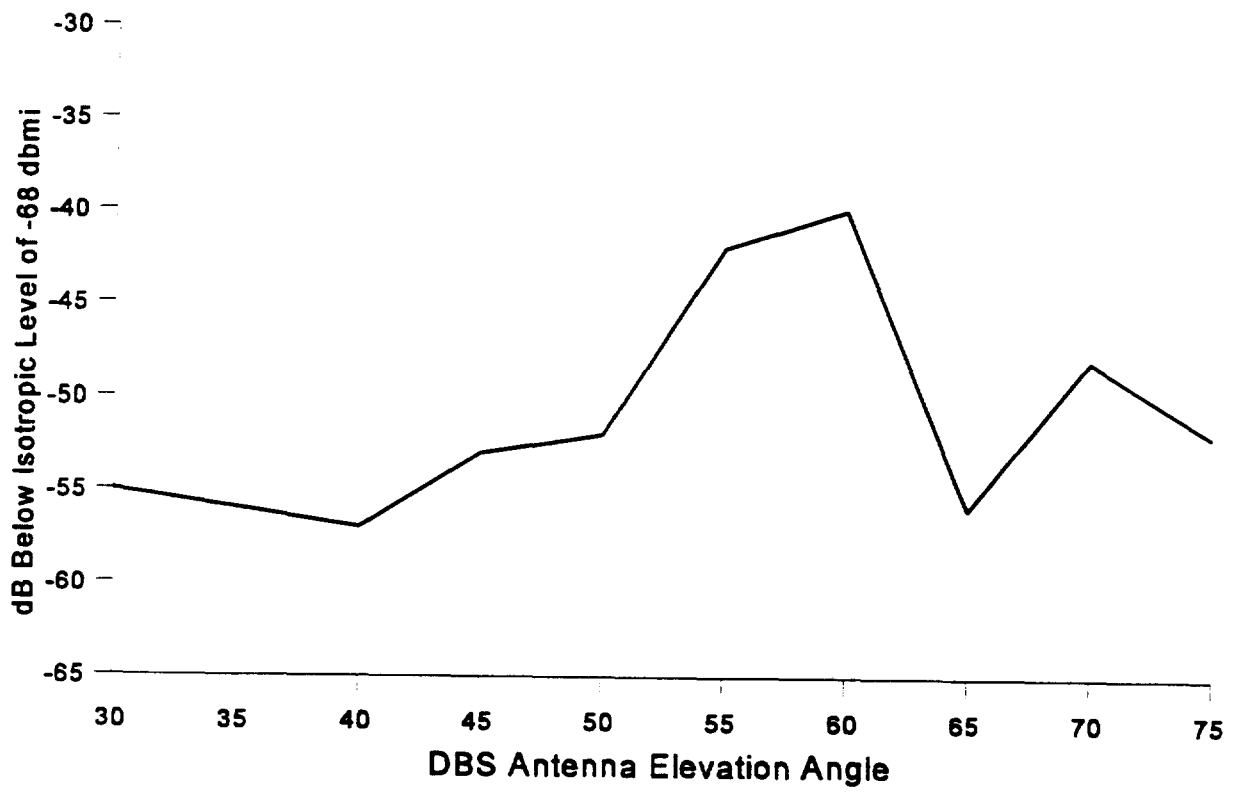


Figure 3.3-1

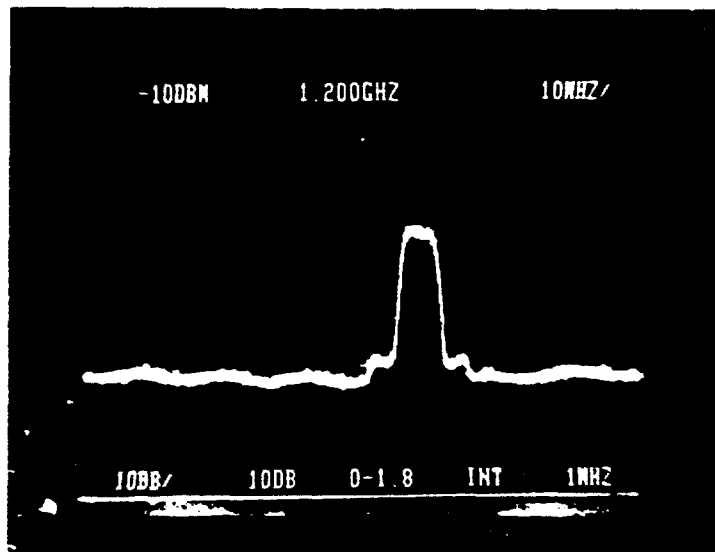
King Ranch, Texas

Reference  
Level  
dBm<sub>i</sub>

Diversified Communications Engineering

Azimuth: 180°

-93



Antenna Centerline: 9 Ft.

Elevation: 30 degrees

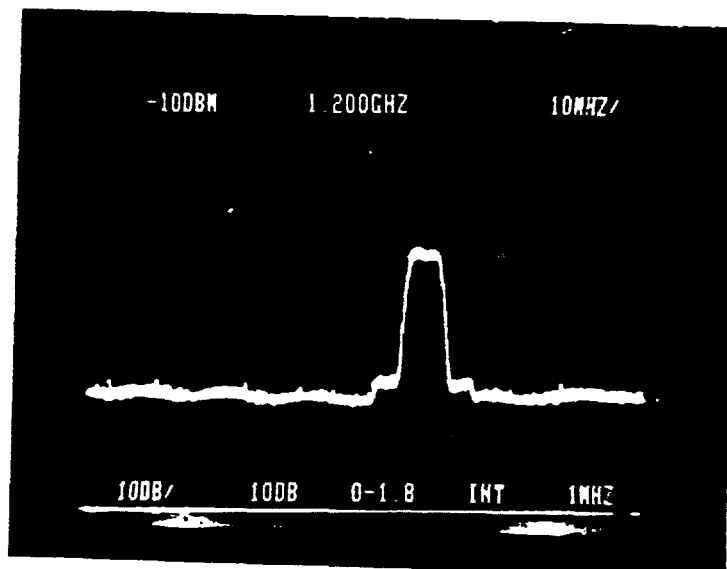
Level: -123 dBm<sub>i</sub>

(A)

Reference  
Level  
dBm<sub>i</sub>

Azimuth: 180°

-93



Antenna Centerline: 9 Ft.

Elevation: 35 degrees

Level: -124 dBm<sub>i</sub>

(B)

Figure 3.3-2 RF Spectrum Analysis

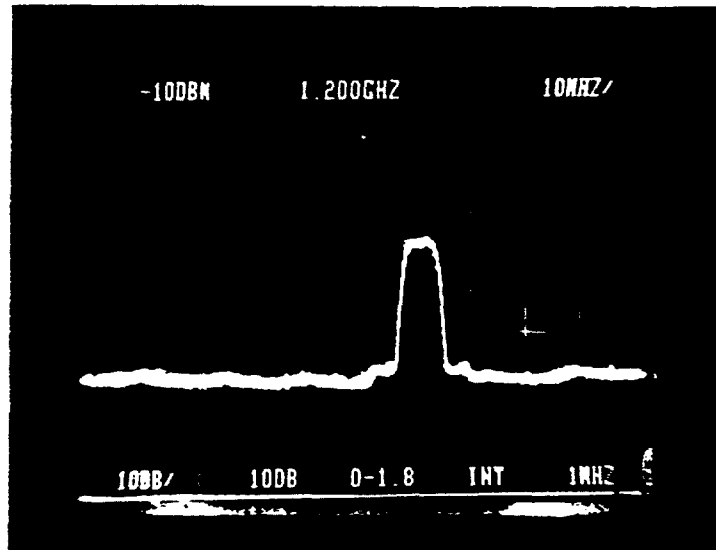
King Ranch, Texas

Azimuth: 180°

Reference  
Level  
dBm<sub>i</sub>

Diversified Communications Engineering

-93



Antenna Centerline: 9 Ft.

Elevation: 40 degrees

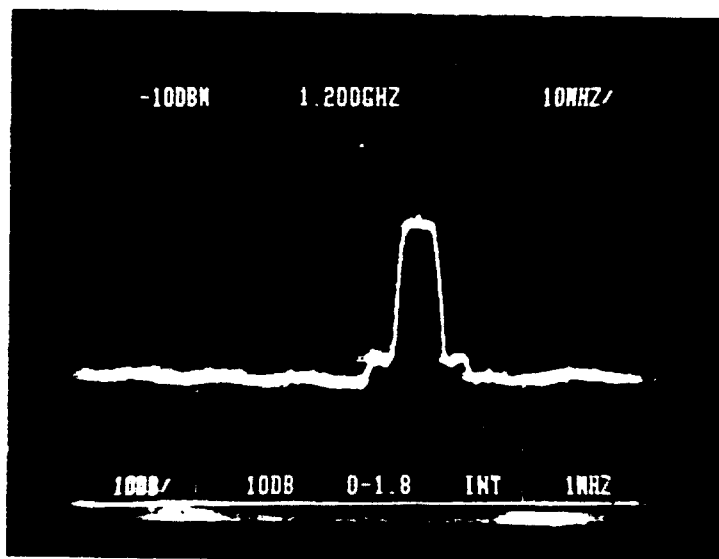
Level: -125 dBmi

(A)

Reference  
Level  
dBm<sub>i</sub>

Azimuth: 180°

-93



Antenna Centerline: 9 Ft.

Elevation: 45 degrees

Level: -121 dBmi

(B)

Figure 3.3-3 RF Spectrum Analysis

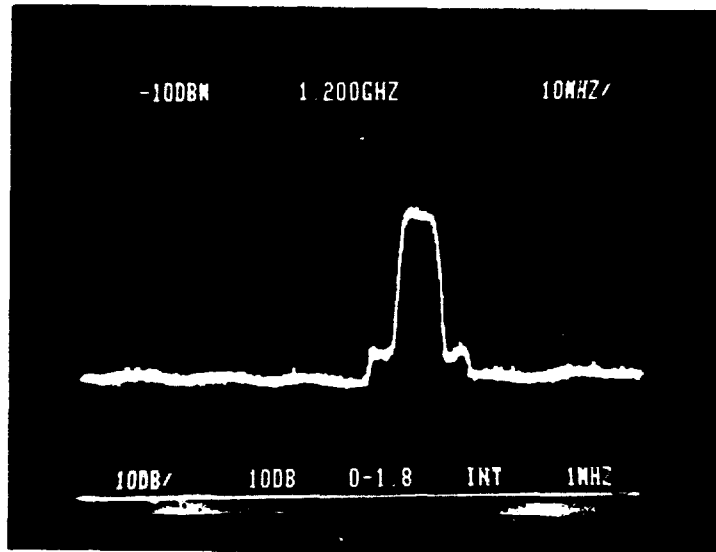
King Ranch, Texas

Azimuth: 180°

Reference  
Level  
dBm<sub>i</sub>

Diversified Communications Engineering

-93



Antenna Centerline: 9 Ft.

Elevation: 50 degrees

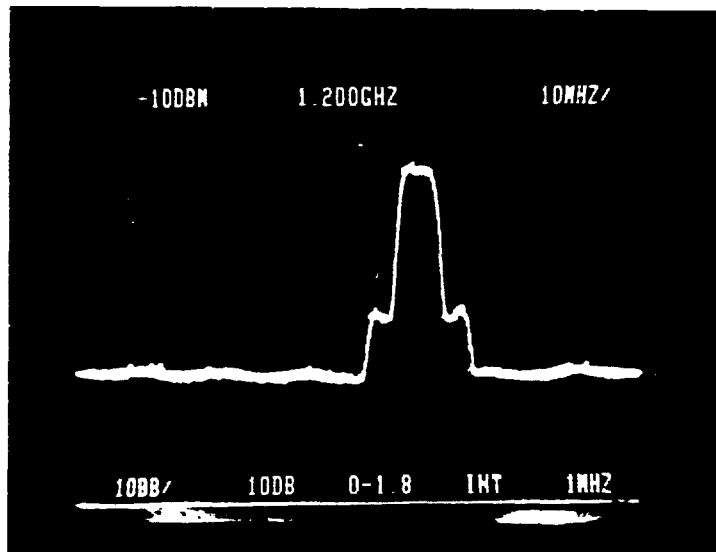
Level: -120 dBm<sub>i</sub>

(A)

Reference  
Level  
dBm<sub>i</sub>

Azimuth: 180°

-93



Antenna Centerline: 9 Ft.

Elevation: 55 degrees

Level: -110 dBm<sub>i</sub>

(B)

Figure 3.3-4 RF Spectrum Analysis

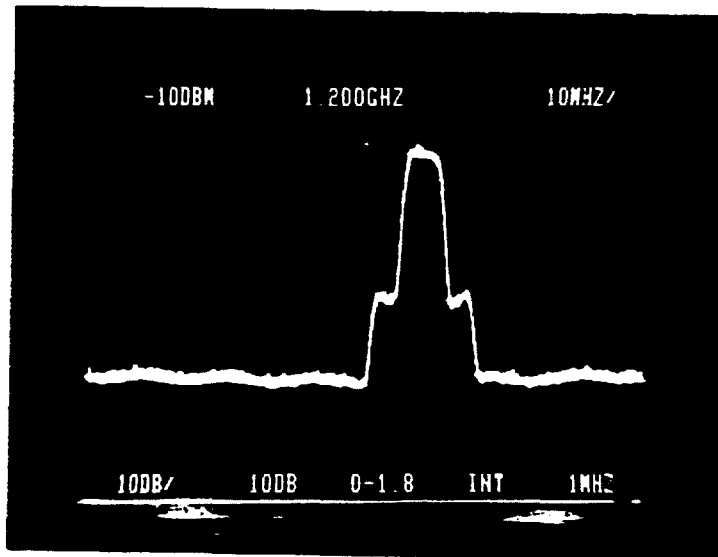
King Ranch, Texas

Reference  
Level  
dBm<sub>i</sub>

Diversified Communications Engineering

Azimuth: 180°

-93



Antenna Centerline: 9 Ft.

Elevation: 60 degrees

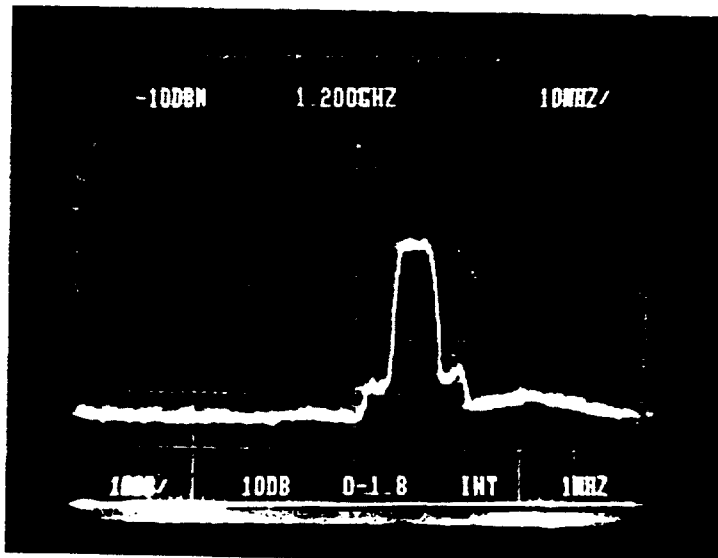
Level: -108 dBm<sub>i</sub>

(A)

Reference  
Level  
dBm<sub>i</sub>

Azimuth: 180°

-93



Antenna Centerline: 9 Ft.

Elevation: 65 degrees

Level: -124 dBm<sub>i</sub>

(B)

Figure 3.3-5 RF Spectrum Analysis

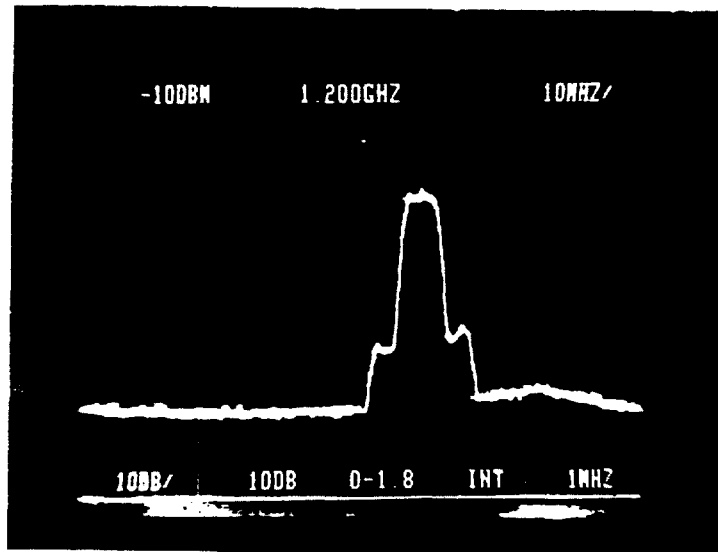
King Ranch, Texas

Azimuth: 180°

Reference  
Level  
dBm<sub>i</sub>

Diversified Communications Engineering

-93



Antenna Centerline: 9 Ft

Elevation: 70 degrees

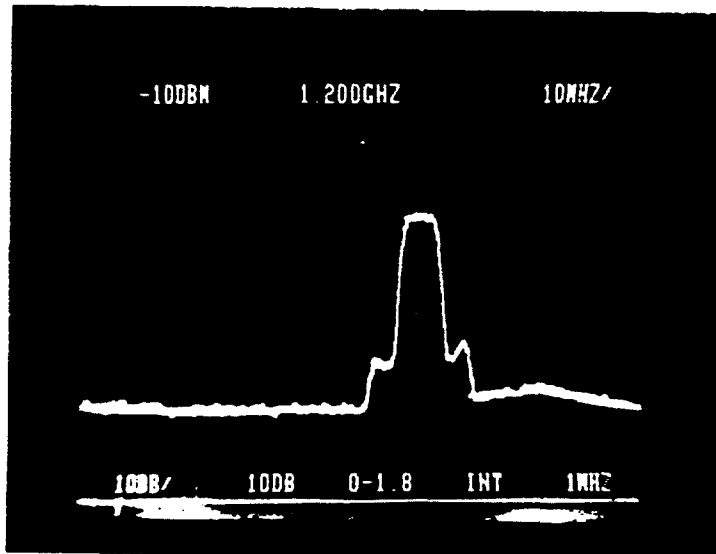
Level: -116 dBmi

(A)

Reference  
Level  
dBm<sub>i</sub>

Azimuth: 180°

-93



Antenna Centerline: 9 Ft.

Elevation: 75 degrees

Level: -120 dBmi

(B)

Figure 3.3-6 RF Spectrum Analysis

## SECTION 4

### SUMMARY OF RESULTS

#### 4.1 C/I Discussion Based on Observed Levels During Testing

Once the 12 GHz isotropic level at a given measurement site was verified with the Comsearch test set, an L-band isotropic reference could be established on the spectrum analyzer (Section 3 data).

The DBS antenna was aligned on either the DIRECTV or ECHOSTAR satellite and the signal peaked for maximum satellite signal strength utilizing both the spectrum analyzer and the DBS system. The interference could then be observed (when present) along with the DBS signal.

The observed levels of two digital signals had to be corrected based upon bandwidth (all spectrum analyzer readings were at 1 MHz resolution bandwidth). The transmitter bandwidth used was 8 MHz (correction factor of 9 DB). A satellite bandwidth of 24 MHz was used (correction factor of 13.8 DB).

The transmitter power was then reduced until interference was no longer observed in the DBS system. Table 4.1-1 shows the transmit power required to achieve acceptable reception on the DBS system for each of the test sites as shown in Figure 2.6-1

Although the reduced isotropic level at 12 GHz was know based on the previous full power verification, the L-Band interference isotropic level could not be determined when masked by the satellite signal since exact DBS antenna characteristics were not known.

The following method for establishing a working C/I value was used:

It was observed that when the interference (as seen at L-band) approached the satellite signal level the interference would cease. Once the interference ceased the DBS antenna was slightly detuned, first in azimuth, then again in elevation; each time the interference level at L-band was recorded as it appeared just above the transponder level (see Figures 3.1-3 and 3.1-13). In this manner the value of about 5 dB for the C/I needed to eliminate interference was determined.

The fact that the C/I of 4.8 dB is reached when both signals appear at the same level on the screen is due to the difference in the digital correction factors for the two different bandwidths.

$$\begin{array}{lcl} \text{Satellite transponder} & 24 \text{ MHz/13.8 dB correction} & \\ \text{interference} & \underline{8 \text{ MHz/ 9 dB correction}} & \\ \text{C/I value needed} & = & 4.8 \text{ dB difference} \\ \text{for no interference} & & \end{array}$$

Consistently, at all sites, when the interference level was equal to or below the satellite level as seen on the analyzer screen at L-band, no interference to the DBS signal was observed. This represented a C/I value of about 5 dB or less.

**Table 4.1-1**

Test Site	Distance from Transmitter	Transmitter Power in dBm (29 dBm full power)	
		DIRECTV	ECHOSTAR
#2	1800' behind transmitter	29	29
#3	1320'	11	9
#4	6330'	29	29
#5	7400'	20	29
#6	8975'	N/A	N/A
#7	5280'	29	29
#8	1320'	N/A	5
#9	600'	9	9
#10	610' behind transmitter	29	29
#11	1400' behind transmitter	29	29
#12	1100' behind transmitter	29	29
#13	9.9 miles	29	N/A

The power levels stated above represent the highest transmit power measured while maintaining acceptable television reception on the DBS satellite system. This process involved monitoring of a television set connected to the DBS satellite receiver. Unacceptable reception was determined by a loss of audio along with the video image freezing on the screen.

## **4.2 DBS Antenna Azimuth Test**

The DBS antenna was pointed in the direction of the interference source at an elevation angle of 32 degrees. The interference source was one mile from the receive location.

The predicted receive level at the DBS site for the 29 dBm output power, the 2 dB of waveguide losses, an antenna gain of 10 dBi and a free space loss of 118.5 dB is -81.5 dBm. The measured receive level was -89 dBm or 7.5 dB below the predicted line-of-sight level.

For the measurement data tabulated in Section 3.2, the received levels vary from -131 dBm to -149 dBm from 0 to plus or minus 180 degrees or from 42 to 60 dB below the actual signal level at the measurement point.

The pattern seems to have peaks at 135 degrees and at 225 degrees at +/- 45 degrees from the interference source. Table 4.2-1 presents the antenna gain relative to the level measured at the 180 degree point.

**Table 4.2-1**

	<u>Azimuth</u>	<u>Signal Level (dB)</u>	<u>Relative Level</u>
	180	-145	0
165	(+15)	-140	5
195	(-15)	-141	4
150	(+30)	-139	6
210	(-30)	-136	9
135	(+45)	-135	10
225	(-45)	-131	14
120	(+60)	-147	-2
240	(-60)	-141	4
105	(+75)	-147	-2
255	(-75)	-144	1
90	(+90)	-145	0
270	(-90)	-146	-1
75	(+105)	-149	-4
285	(-105)	-146	-1
60	(+120)	-145	0
300	(-120)	-141	4
45	(+135)	-144	1
315	(-135)	-141	4
30	(+150)	-148	-3
330	(-150)	-141	4
15	(+165)	-146	-1
345	(-165)	-146	-1
360	(+/-180)	-143	2

There are no conclusions made based on this data.

### **4.3 DBS Antenna Elevation Test**

The DBS satellite receive antenna was pointed away from the interfering source and measurements were made where the antenna elevation was varied from 30 to 75 degrees in elevation. The receive signal level at the satellite locations was predicted to be -69.5 dBm based on the 1320 foot distance from the interference source. The measured level was -68 dBm which is within 1.5 dB of the predicted.

Elevation angle	Signal Level (dBm)	Level below 68 dBm
30	-123	55
35	-124	56
40	-125	57
45	-121	53
50	-120	52
55	-110	42
60	-108	40
65	-124	56
70	-116	48
75	-120	52

# **Exhibit 5**

## **Reply Comments**

## **Reply Comments**

**Submitted by Northpoint Technology**  
**To: Federal Communications Commission**  
**Date: May 5, 1998**

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20554

In the Matter of	)	
	)	
<b>NORTHPOINT TECHNOLOGY</b>	)	<b>RM No. 9245</b>
	)	
Petition for Rule Making To Modify Section	)	
101.147(p) of the Commission's Rules To	)	
Authorize Subsidiary Terrestrial Use of the	)	
12.2-12.7 GHz Band By Direct Broadcast	)	
Satellite Licensees and Their Affiliates	)	

**REPLY COMMENTS OF NORTHPOINT TECHNOLOGY**

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**Dated: May 5, 1998**